



# Space Launch System

## Highlights

June 2012



## EFT-1 Offers First Look at SLS Flight Hardware

Marshall engineers are building an innovative adapter that – during Exploration Flight Test 1 (EFT-1) in 2014 – will allow the Orion spacecraft to be launched atop a Delta IV rocket not originally designed to carry it. The performance data will have important implications for both the Delta IV and the SLS rocket, since each will use the same hardware design to carry the Orion crew capsule into space.

“We have the unique opportunity to design (this SLS) hardware early and provide it for Exploration Flight Test 1, saving time and money,” said David Beaman, SLS spacecraft and payload integration manager. He noted that the initial drawings were released four days after formal authority to proceed. “By designing the adapter for both missions, we provide an affordable solution to keep our human exploration mission moving forward.”

EFT-1 will also benefit SLS by flight-testing two elements similar to the top portion of the first SLS vehicle configuration: an EFT-1 cryogenic propulsion stage (or kick stage) that resembles the SLS Interim Cryogenic Propulsion Stage (ICPS) to be used in 2017 and 2021, as well as Orion itself.

“When you fly a vehicle for the first time, you want to know as much as possible, and the EFT-1 mission will allow our SLS team to learn about the structural, mechanical and electrical interfaces – the internal environment between Orion and the launch vehicle,” said Garry Lyles, SLS chief engineer.



Spacer rings are machined for the Orion Multi-Purpose Crew Vehicle (MPCV)/Stage Adapter (MSA) at Marshall. *Photo credit: NASA/MSFC*

# J-2X Powerpack Sets New Test Record

Stennis Space Center set a new record during a J-2X powerpack test (1,150 sec) on June 8, which lasted over a full minute longer than the previous record for the longest duration firing ever conducted in the A Test Complex.

“This is the longest and the most complex J-2X test profile to date,” said Mike Kynard, SLS liquid engines manager. “By combining as many test objectives as we can, we aim to get the most out of every opportunity and work as affordably and efficiently as possible while maintaining a reasonable level of risk.”

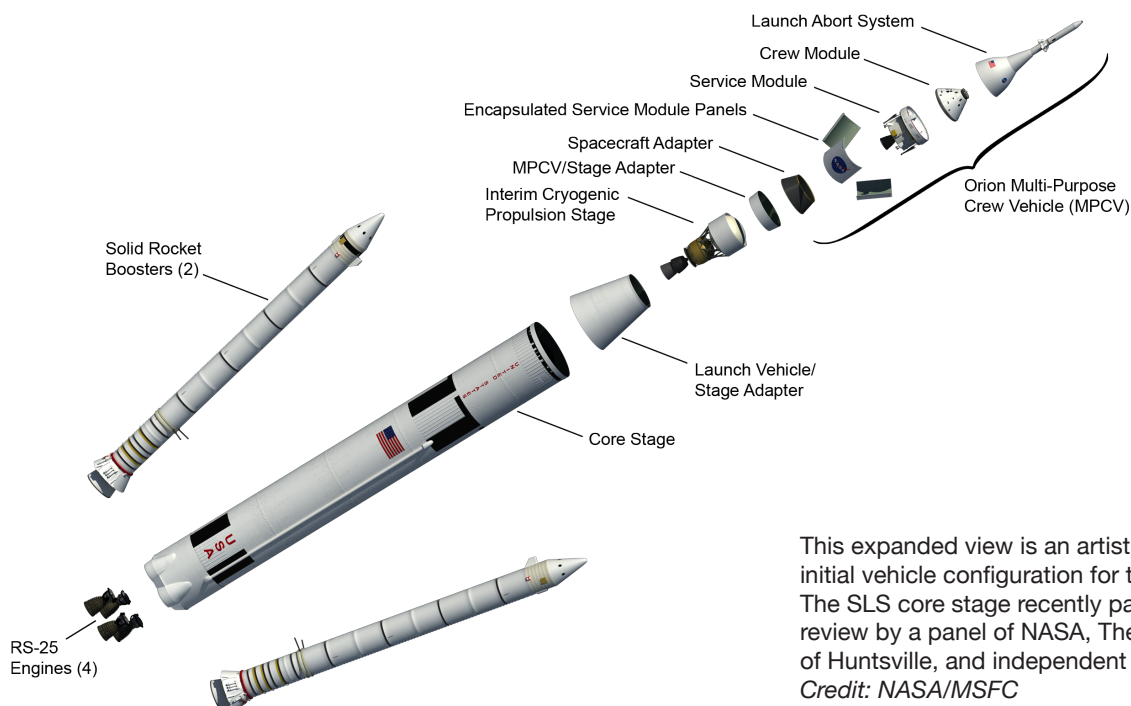


Test engineers throttled the J-2X powerpack up and down several times to explore numerous operating points required for the fuel and oxidizer turbopumps. *Photo credit: NASA/SSC*

## Space Launch System Completes Core Stage SRR/SDR

SLS successfully completed its System Requirements Review/System Definition Review (SRR/SDR) for the core stage element on June 15. Engineers from NASA and The Boeing Company of Huntsville presented a full set of system requirements, design concepts, and production approaches to technical reviewers and an independent review board. Boeing is the prime contractor for the SLS core stage, including avionics.

“This meeting validates our design requirements for the core stage of the nation’s heavy-lift rocket and is the first major checkpoint for our team,” said Tony Lavoie, SLS stages manager. “I’m proud of the collaboration between NASA and our partners at Boeing. Now that we have completed this review, we go from requirements to real blueprints. We are right on track to deliver the core stage for the SLS program.”



This expanded view is an artist’s concept of the initial vehicle configuration for the SLS rocket. The SLS core stage recently passed a major review by a panel of NASA, The Boeing Company of Huntsville, and independent engineers. *Credit: NASA/MSFC*



## SLS Program Manager Delivers Keynote Address at NSMMS

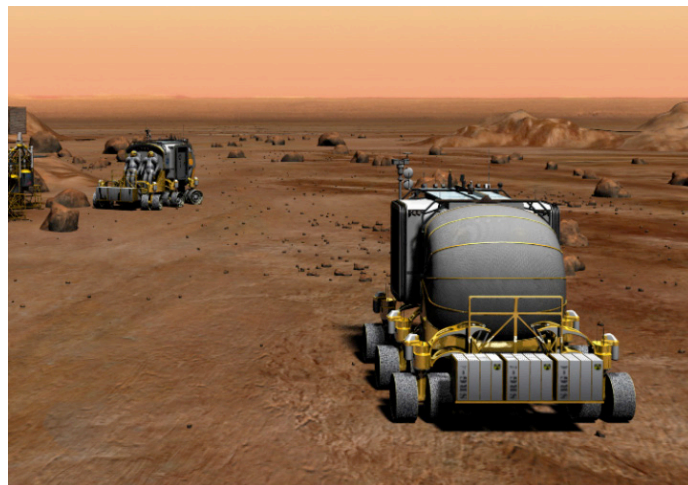
SLS Program Manager Todd May presented a keynote address at the National Space and Missile Materials Symposium (NSMMS) in Tampa, Florida on June 25. NSMMS was sponsored by NASA, the U.S. Air Force, and General Dynamics Information Technology, allowing 350 technology leaders to review challenges and share advances with the U.S. aerospace materials community from June 25 – 28.

May focused on NASA's vision and mission, as well as how research, development, and production are progressing for America's new human-rated, heavy-lift SLS rocket. He also discussed behind-the-scenes work being done in areas such as friction stir welding for the core stage, environmentally friendly insulation improvements on the five-segment solid rocket boosters, and selective laser melting for J-2X upper stage engine parts.

As a materials engineer, May said that he appreciates being able to talk about SLS at a forum like NSMMS. "Any opportunity to talk to our government and industry partners is a good one, because they need to know what we're doing and that we're making progress. And they have ideas and technologies with potential use for SLS."



Aluminum MSA spacer rings are machined at Marshall.  
Photo credit: NASA/MSFC



Artist's concept of Mars exploration. Credit: NASA/JSC

## SLS Offers Benefits for Mars Exploration

The Concepts and Approaches for Mars Exploration Workshop was held at the Lunar and Planetary Institute (LPI) in Houston from June 12 – 14 as part of NASA's efforts to forge a new Mars strategy. The event was attended by nearly 200 scientists, engineers, and graduate students from NASA, federal laboratories, academia, industry, and international partner organizations. Over 1,600 people worldwide also watched live streaming of the workshop over the Internet.

SLS Strategic Development Manager Steve Creech challenged those researchers to rethink how to develop their next big priority: the first mission to bring back samples from Mars, which is a top priority of the National Research Council's Planetary Science Decadal Survey. "One of the big challenges for scientists is how they can do a Mars sample return mission for lower cost," Creech explained. "There's a valuable opportunity for researchers here: how would they design a less complex and more robust Mars sample return mission if they had the unparalleled payload fairing size and performance offered by SLS?"

The workshop will help NASA reformulate the Mars Exploration Program (MEP) in ways that are responsive to high-priority science goals and the challenge of sending humans to Mars orbit in the 2030's. (Abstracts and session videos are available at the [conference website](#).)

(continued on page 4)

## Mars Exploration

(continued from page 3)

The Mars Exploration Program reformulation activity is led by NASA's Science Mission Directorate, working with the Human Exploration and Operations Directorate, the Office of the Chief Technologist, and the Office of the Chief Scientist. The result will be a plan addressing goals set out in the Planetary Decadal Survey and target missions, starting with a launch opportunity to Mars in 2018.



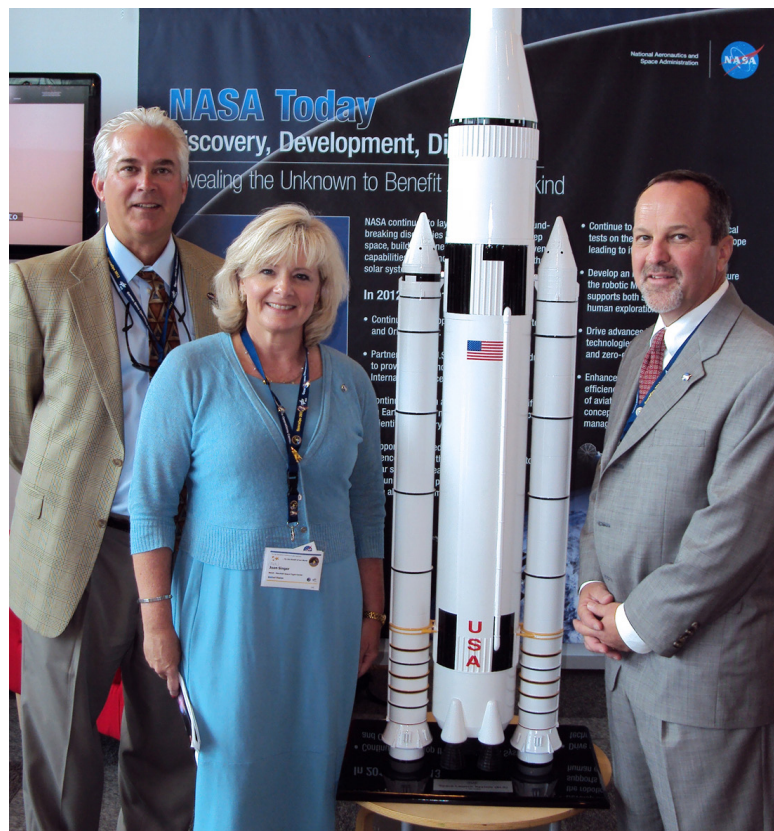
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## SLS Managers Make Presentation at SpaceOps 2012

SLS executive managers participated in the 12th International Conference on Space Operations (SpaceOps 2012) held in Stockholm, Sweden from June 11 – 15. The conference was sponsored by the German Aerospace Center (DLR) and the Swedish Space Corporation (SSC). This year's event welcomed 678 attendees from 35 countries, representing 165 companies, agencies, and institutions. SLS operations strategy was discussed in a briefing presented by Deputy Program Manager Jody Singer and Associate Program Manager Jerry Cook. Their conference paper, "NASA Space Launch Systems Operations Strategy," was co-authored with Marshall's Engineering Director Chris Singer. It was selected for publication in the SpaceOps 2012 post-conference book, a distinction conferred upon only 32 papers out of more than 300 accepted for the conference.



Shown at SpaceOps 2012 are (from left) Chris Singer, director of Marshall's Engineering Directorate; Jody Singer, SLS deputy program manager; and Jerry Cook, SLS associate program manager. Photo credit: NASA/MSFC